Prof. F. E. Weiss contributed the results of observations on the garden Tropæolum, some plants of which bore flowers of different colour at different seasons of the year. These and other cases of differing flower coloration, *e.g.* in *Anagallis arvensis*, are under investigation to ascertain to what degree they are hereditary characters, and to which factors the changes are to be attributed.

Animal pests naturally received considerable attention. Dr. R. Stewart MacDougall emphasised the importance in dealing with coleopterous enemies of trees of taking account of the length of life passed in the various stages, whilst in a second paper he dealt with the sheep-maggot fly (*Lucilia sericata*) and the problems suggested by its life-history, and announced the first record in this connection of *Protocalliphora azurea*. Other pests dealt with were the warble-fly of the reindeer, by the president; a species of Rhabditis injurious to cress, by Mr. G. O. Sherrard; the horse bot-fly, by Mr. Collinge; and the larch saw-fly, by Mr. Mangan. Dr. Malden dealt with the diseases of bees, and Mr. W. G. Freeman with the economic importance of the cambium in plants.

The members of the association attended the formal opening of the Biological Experimental Laboratories at Fallowfield, when Sir Thomas Elliot, of the Board of Agriculture, spoke of the harmonious relations now in existence between practice and science, and the welcome degree to which the agriculturist is prepared to appreciate the aid of the man of science in attempting to solve difficulties. The new Manchester laboratories owe their origin to such calls for aid, and Sir Thomas indicated that the Board of Agriculture would be prepared to assist financially, so far as it could, the local efforts in providing the means for research in economic biology.

W. G. F.

THE FIRST INTERNATIONAL AGRO-GEOLOGICAL CONFERENCE.[1]

SOME time ago the Royal Hungarian Geological Institute sent out letters of invitation to those interested in soils in the various countries of Europe and America asking them to attend an International Conference in Budapest, where some attempt would be made at standardising methods and objects. Some degree of uniformity is urgently needed. "Plus que partout ailleurs," says the secretary in his introduction to the present volume, "il y règne une disparité d'idées, de méthodes, de procédés, une divergence de vue sur le chemin à prendre et sur le but à atteindre, un chaos dans l'usage des termes scientifiques, des mesures, des figurés, des noms et des classifications: divergence qui se manifeste non seulement de pays à pays, de langue à langue, mais aussi entre les œuvres d'un même pays et dans la littérature d'une même langue." Some confusion is for a time inevitable in a borderland subject like the present, that joins up with geology, botany, and chemistry, and is closely connected with agriculture; indeed, even its very name has not yet been settled, for we find the subject of the conference referred to as agrogeology, agricultural geology, pedology, or simply "the science of the soil."

The results of the conference are now issued in the volume before us. Several of the papers are descriptive of the soils of the countries in which the respective writers are working, among them being accounts of the soils of European and Asiatic Russia, of Norway, of Rumania, and Bohemia. As an illustration of the method adopted, Prof. Glinka's account of the Russian soils may be noted. There are six main zones recognisable, running in belts from north-west to south-east, and corresponding fairly completely with the climatic and vegetation zones. The most northerly is the Tundra zone, practically destitute of vegetation higher than lichens and mosses. The soils have been but little investigated, but appear to be generally acid and rich in partially decomposed organic matter. South of this lies the Podzol zone, covered with forest, or in lower lying places with marshes and lakes. The typical podzols may be sands, loams, or clays; they are white when dry, acid, generally poor in mineral plant food, but contain a fair amount of organic matter, and they are porous. There is either a pan or else a good deal of concretionary matter in the subsoil, the former being usual in the sands, the latter in the loams and clays. This zone covers an enormous area in Russia and Siberia; it is not much cultivated, the method adopted usually being to clear a part of the forest, crop for a few years, then leave to run wild again, and move on to some freshly cleared ground; to the south, however, the agriculture is much more advanced. Throughout this zone the low-lying soils differ somewhat in type by reason of the accumulation of humus and the presence of reduction products such as pyrites, marcasite, and others; they are more like moorland soils.

The next zone is the famous black earth or Tschernosiom zone, but in between the two is a transition zone occupying the region of the prehistoric steppes now in forest, so that the original steppe soil has become modified. The calcium carbonate originally present may still be found lower down in the soil, and there is also more food material than in the soils further north; still, in the main, these soils are of the podzol type. The black earth proper stretches from the Carpathian to the Ural mountains, and thence across to Siberia; it covers Volhynia in the west and Perm in the east. It is characterised by a dark grey or black layer rich in humus and granular in structure, overlying a subsoil rich in calcium carbonate; this subsoil may originate either from loess, drift clay, or marine deposits. There are no forests, except in the north, as already mentioned, the whole region being steppe country now largely in cultivation producing cereals. Several other types of soil scattered as islands over the zone are described in the paper, but need not concern us here.

Southwards come the chestnut-coloured soils of laminate, and not granular, structure, where the black humus layer is thinner or absent, although calcium carbonate is found in quantity, as in the soil underlying the black earth. We are now approaching the dry steppes, a pastoral region inhabited by a nomad population. Alkali soils are not uncommon in this and the lower zones.

Below this come two others in the semi-desert region, where the rainfall is 8 to 12 inches per annum only, the northern layer being brown and the southern grey or white. They have not been much studied as yet.

We have dwelt at some length on this paper because it illustrates the difficulties in the way of introducing any uniform international system of soil classification. Any attempt to arrange British soils in zones in this way would fail; indeed, in one paper where a very broad system was used, all British soils were classed as of one type. After looking through the descriptions of the soils of the other countries we feel bound to agree with Prof. Hilgard that each region should adopt its own classification. Distinctions of colour, he points out, are not of sufficient general significance to form a basis of uniform soil classification, yet in a particular region they may be of vital importance, and would form the only basis useful in practice. Ramann has drawn up a scheme of classification, so also has Sibirtzeff, both admirable so far as they go, yet neither will fit the soils of California. Indeed, the various authors at the conference were looking at the subject from at least two different points of view: some were considering the zones of continental areas, others confined themselves to the soils of small regions. Climate reacts on soil to a marked extent. The soils of arid and of humid regions differ fundamentally, as Hilgard has shown. To take an illustration from Prof. Glinka's paper, the difference between the black earth and the chocolate-coloured or grey soils further south may arise entirely from climatic causes. Over continental areas, therefore, climatic zones will furnish a useful method of grouping soils in the first instance; but it is not complete, for marked variations occur among the soils in the same zone, necessitating a more detailed classification which would take account of the presence or absence of calcium carbonate, and the "lightness" or "heaviness" of the soil on cultivation. Probably several systems of classification would be found necessary to fit the various climatic regions. If the conference failed to come to any agreement on this subject, it at any rate did much useful work in bringing out the inherent difficulties.

Another matter was dealt with which ought to be capable of arrangement. At present no two countries adopt

[1] "Comptes rendus de la première Conference internationale agrogéologique." Publié par l'Institut géologique du Royaume de Hongrie. (1909.)

the same methods of soil analysis. This would not matter much if the methods were all absolute; unfortunately, they are mainly conventional. Thus an English analyst will say that a soil contains 0·2 per cent. of total potash, meaning by this the amount extracted by hydrochloric acid under particular conditions, although the *real* total is probably three or four times this amount. Continental and American analysts, working on the same soil, but using different methods, would reach wholly different results. The trouble is still worse in the mechanical analysis of soils. "Clay" in Great Britain means material less than 0·002 mm. in diameter, in the United States it stands for particles less than 0·005 mm. in diameter; elsewhere a widely different limit—0·01 mm.—is adopted; so with the other terms. In consequence, one can never compare mechanical analyses made in one country with those made in another; the same terms are used, but they denote different things. The confusion thus introduced into an already difficult subject is most unfortunate. One great advantage of international conferences of this sort would be to prevent such confusion arising in the future.

E. J. RUSSELL.

SCIENCE IN SOUTH AFRICA.[1]

THE Royal Society of South Africa consisted at the time of its annual report (April, 1909) of forty fellows and 160 members; it had held six meetings during the preceding year, ten papers altogether being read. Part i. of the Transactions, in which these papers appear, contains 334 pages; part ii. contains the papers read at subsequent meetings, and has expanded to 477 pages, since there were nineteen papers in place of ten. Most of the papers deal with local matters; only about half a dozen are concerned with general problems, and of these three are mathematical.

The local papers are mainly botanical. Dr. Schönland, of the Albany Museum, Grahamstown, gives a full description of *Haworthia truncata*, Schönl., the only species of Haworthia with strictly distichous arrangement of leaves. The leaves are to a large extent underground, while the exposed parts resemble small pebbles, so that the plant may be classed among the so-called "mimicry plants." Its structure is well adapted to its peculiar mode of life. The truncate apex is without chlorophyll, and thus forms a "window" through which light can pass by way of the central transparent tissue to the assimilating tissue which extends to the underground basal parts of the leaves. Dr. Marloth describes other plants possessing the same structure.

Experiments were also made to find out whether the aërial parts of plants, particularly those growing in arid regions, can absorb moisture from the air. In the Karroo there is commonly a fall of dew at night. Dr. Marloth's experiments indicate that the native plants can take sufficient moisture from this source through their leaves to satisfy their requirements. Dr. Schönland, on the other hand, is not satisfied on this point; the plants examined by him did not appear to absorb from the air anything like a sufficient quantity.

Mr. A. L. du Toit, of the Geological Survey, describes the evolution of the river system of Griqualand West. This system is very complex, but its history can be traced to a remote geological period. In Palæozoic times a continent, at a level lower than the present, extended over this area, the drainage from it being directed southwards mainly along the Kaap valley. At the close of the Carboniferous epoch this continent was intensely glaciated, and finally buried beneath the Permo-Triassic Karroo deposits; upon the surface thus formed the modern drainage system was initiated. In later periods—in late Jurassic, Cretaceous, and Tertiary times—there has been a succession of uplifts, but the rivers have been enabled to cut a peneplain. One of the most important of these surfaces extended from the Stormberg probably into Griqualand West, where it is represented by the Kaap Plateau. This surface has suffered denudation, and the rivers have cut down and laid bare the pre-Karroo floor with its drainage lines.

Dr. Broom discusses the relationship of the South African fossil reptiles to those found in other parts of the world. The Lower Karroo fauna of South Africa shows many points of resemblance to the Permian in America; it seems practically certain that both are modifications of an earlier fauna which probably inhabited a southern continent joining Brazil and South Africa. The American types are considered to be nearer the ancestral, though considerably specialised; the African, probably owing to their living in the swamps of the Karroo, developed greater length of limb and tended to become more active; but in South Africa the conditions must have been such as to promote rapid evolution, for many new types soon appeared, the most remarkable being the Anomodonts, which probably originated there. Towards the end of Permian times a land connection with Europe seems to have formed, by which the pareiasaurian fauna passed into Europe; still later—in the Upper Triassic beds of Burghersdorp—a number of European types passed into Africa without, however, any of the Cynodonts, highly characteristic of this period in Africa, passing back in return. In Lower Jurassic times land connection was well established. There is evidence of continuous land between Africa and Australia in Upper Triassic times.

The mathematical papers by Dr. Muir deal with a theorem regarding a sum of differential coefficients of principal minors of a Jacobian, an upper limit for the value of a determinant, and Borchardt's form of the eliminant of two equations of the *n*th degree. Other papers deal with the spectrum of the ruby, snake venom, the rainfall of South Africa, evaporation in a current of air, a list of the flora of Natal, and so on.

The *South African Journal of Science* is the organ of the South African Association for the Advancement of Science, its objects being to give a stronger impulse and a more systematic direction to scientific inquiry, to obtain a more general attention to the objects of pure and applied science, and the removal of any hindrances barring the progress of science. Instead of issuing one large annual volume, like our own association, a small journal is sent each month to the members. The numbers of the present volume (vol. vi., beginning November, 1909) contain the presidential addresses and some of the papers read before the sections; notes and articles from other sources are, however, included. The papers, nearly sixty in all, have the general merit of dealing with local phenomena, thus putting on record something that may pass away and be lost, or else attacking problems that can only be investigated on the spot.

It is eminently satisfactory to find that sufficient material exists to keep going these and the other scientific journals and societies of South Africa, including the geological, the chemical, and the engineering societies. South Africa has hitherto loomed so largely in the political and commercial worlds that it will come as a surprise to some to find that research work has been going on quietly and steadily for several years. The foundation has been laid on which a great superstructure may be raised; it has been proved that the fauna and the flora show in relation to their surroundings many features of very general interest and importance; a number of problems have thus been suggested for future workers to attack. Most important of all, however, is the fact that the spirit of research is abroad in South Africa at a time when colleges and universities are being founded and agricultural departments developed. There is, in consequence, the prospect that these new foundations may be started in the right direction at the outset, and so attain a position worthy of the vast possibilities of the country. The men who are now devoting themselves to research work are therefore making more than an examination of local problems, important as this is in a developing country where development often means extermination of species and obliteration of old records. They are creating an atmosphere in which the college and departmental staffs can do research work, in which, indeed, men will feel impelled to investigate. To do this in a busy commercial country like South Africa is no small achievement.

[1] Transactions of the Royal Society of South Africa, vol. i., 1910. The South African Journal of Science, vol. vi., 1909–10.